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The present invention relates to a device for fluid transference and more particularly to a needle-catheter assembly which permits introduction of a catheter into a blood vessel or other body lumen.

5 Various devices are known which enable a catheter to be introduced into a vein or other lumen for such purposes as transfusions. These devices include a hollow needle having a catheter riding within it which combination is introduced into the lumen as a unit. The needle is then withdrawn over the catheter, leaving the catheter in position within the lumen. Such a device has the disadvantage that the needle must remain
10 associated with the catheter after it has been withdrawn or the catheter connected to the fluid source after the needle has been slipped off over the unattached end of the catheter. To avoid this inconvenience it has been proposed to use a slotted needle which is a needle slotted longitudinally to enable its lateral separation from the catheter. However, known slotted
15 needles are impractical to use since the hole made by the needle is somewhat larger than that needed to pass the catheter through it causing fluid to leak through the hole at its perimeter. Also the catheter will not remain immovable within the needle during venipuncture, at least without the use of auxiliary clamping means.

20 To overcome these difficulties the present invention proposes use of a needle-catheter assembly in which the slotted needle is dimensioned to exert a clip action on the catheter positioned within it and is adapted to be separated from the catheter not by lateral disengagement but by slipping an elbow portion of the catheter, wedged in the slot and projecting later-
25 ally from the needle, longitudinally along the slot.

In its broadest aspect the invention resides in a fluid transference device comprising a hollow needle, a slot in the wall of the needle extending longitudinally the full length thereof, a flexible catheter freely movable longitudinally within the needle and elbowed to project laterally
30 from the needle and through the slot, the slot being of a width inhibiting

lateral separation of the catheter from the needle.

Referring now to the drawings which illustrate one embodiment of the device;

Figure 1 is a perspective view of the device as a whole;

5 Figure 2 is a fragmentary view in perspective of the needle with the catheter positioned within it;

Figure 3 is a cross section taken along the line 3-3 of Figure 2;

Figure 4 is a fragmentary view in elevation of the area where the catheter is elbowed to project laterally from the needle, and

10 Figure 5 is a fragmentary view of the catheter and adaptor showing a guard therewith.

The device as shown in the drawings comprises a needle 1 which is hollow to accommodate a catheter 2. Needle 1, made of conventional rigid material such as thin steel, carries a slot 3 defined by parallel lateral edges 3a and 3b. Slot 3 is longitudinally disposed and extends from one end of the needle to the other. At one end needle 1 is bevelled at 4 to a point 5 and slot 3 terminates at the base of bevel 4.

20 Catheter 2, for use with needle 1, is flexible and also deformable in a circumferential plane. The usual material used for catheters is polyethylene which has been found to be quite suitable for the purpose of the present invention. The outer diameter of catheter 2 is slightly smaller than the internal diameter of needle 1 so that it may move freely within the needle in a coaxial direction. In cross section, as shown in Figure 3, the outer surface of needle 1 describes an incomplete circle. Consequently
25 when catheter 2 lies in needle 1 it projects above edges 3a and 3b of slot 3 to complete an annular surface defined in part by the needle.

30 The width of slot 3 between edges 3a and 3b is critical, that width being slightly narrower than the outer diameter of catheter 2 so that lateral separation or "peeling" of the catheter from the needle is not feasible. However, slot 3 must be wide enough so that a slight pinching of catheter 2

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will allow the catheter to pass laterally through the slot. As shown in Figure 4 catheter 2, elbowed at 10 and pinched at 11, projects laterally through slot 3.

In a preferred embodiment the base of needle 1 opposite point 5 is affixed to a handle 6 to facilitate operation of the assembly. It has been found convenient to fashion handle 6 of high density or hard polyethylene into which the base of needle 1 can be embedded. Handle 6 carries a channel 7 to accommodate an adaptor 8 to which catheter 2 is connected. Handle 6 is angled upwardly from the end to which needle 1 is affixed, as indicated by A in Figure 4, thereby offsetting the needle to give clearance of the gripping hand from the surface to be punctured and allow the needle to be introduced at a minimum angle to that surface. The end of handle 6 remote from needle 1 carries a downwardly extending hook 9, to facilitate withdrawal of the needle.

In the preferred embodiment catheter 2 is slightly shorter in length than needle 1 and slot 3 and is connected at one end to adaptor 8 which serves to link the catheter with a fluid source (not shown). The end of catheter 2 projecting laterally from needle 1 is inserted into a tapered end 12 of adaptor 8 which thus provides a raised annular shoulder 13 ringing the catheter. If catheter 2 is longer than slot 3 and severance of the free end of the catheter is not desired, a guard 15 may be used to shorten the length of the catheter. Guard 15, made of flexible polyethylene, is annular with one end tapering to the diameter of the catheter. By splitting guard 15 longitudinally its other end 17 may be passed over, and be seated on, the end of adaptor 8. By means of the guard the adaptor and its shoulder 13 are in effect extended nearer to the free end of the catheter.

In the operation of the device catheter 2 is "threaded" into needle 1 from point 5. The catheter is first elbowed at 10 adjacent adaptor 8 and is then drawn backwards into slot 3, gradually being pinched at 11 by the edges of bevel 4 as it approaches the slot. Pinched portion 11 of the catheter

subsequently rides in slot 3. Catheter 2 is drawn backwards in needle 1 in this manner until the free end of the catheter is positioned at the base of bevel 4 at the end of slot 3. Since catheter 2 is slightly shorter in length than slot 3 the catheter will project laterally from needle 1 adjacent its base in handle 6.

When introducing the assembly into the body the friction between edges 3a and 3b of slot 3 and pinched portion 11 of catheter 2 will prevent movement of the catheter within needle 1. This clip action of edges 3a and 3b may be supplemented by thumb pressure on adaptor 8 lying in channel 7 of handle 6.

Once bevel 4 of needle 1 is within the body lumen catheter 2 is advanced by lifting adaptor 8 out of channel 7 of handle 6 and applying a forward and downward pressure as indicated by B and directional arrow 14 in Figure 4. This pressure slides catheter 2 forward in needle 1 against the frictional resistance of edges 3a and 3b of slot 3. Since elbow 11 is adjacent adaptor 8, shoulder 13 may be used to ride on edges 3a and 3b when advancing the catheter in the needle.

When catheter 2 has been advanced to its final position of rest within the lumen it is held stationary while needle 1 is withdrawn. During withdrawal of the needle pinched portion 11 continues to slide forward in slot 3 (and ledge 13 on edges 3a and 3b) until it emerges at bevel 4 whereupon the needle and catheter become completely disengaged one from the other.

It will be appreciated that because of the annular surface defined by needle 1 and catheter 2 the perforation left by the needle on withdrawal will not be appreciably larger than the cross-sectional area of the catheter, thus avoiding the disadvantages resulting from an oversize perforation.

Example dimensions of an assembly according to the present invention are as follows:

External diameter of needle	-	0.049 inch
Internal diameter of needle	-	0.041 inch
Outside diameter of catheter	-	0.038 inch (average)
Width of slot	-	0.026 inch

If desired the device may be pre-assembled, sterilized (either by gas or heat depending on the nature of the materials used in the device) and packaged, either individually or collectively, in a manner keeping them sterile for future use.

- 5 It will be seen that the device is constructed simply and of inexpensive materials, making it disposable. By pre-assembly its speedy use is also advantageous.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A fluid transference device comprising a hollow needle, a slot in the wall of the needle extending longitudinally the full length thereof, a flexible and circumferentially deformable catheter freely movable longitudinally within the needle and elbowed to project laterally from the needle through the slot, the slot being of a width inhibiting lateral separation of the needle from the catheter, whereby the needle may be moved longitudinally with respect to the catheter and separated therefrom.
2. A device as defined in claim 1, wherein the needle is affixed at its base to a handle.
3. A device as defined in claim 2, wherein the handle is angled with respect to the axis of the needle.
4. A device as defined in claim 2 or claim 3, wherein the end of the catheter projecting laterally from the needle is connected to an adaptor, the handle being channel-shaped to accommodate said adaptor.
5. A device as defined in claim 2 or claim 3, wherein the free end of the handle carries a hook.
6. A device as defined in claim 1, 2 or 3, wherein the catheter is polyethylene.
7. A device as defined in claim 1, 2 or 3, wherein the needle carries a bevelled point, the slot terminating at one end at the base of the bevel.
8. A device as defined in claim 1, including an adaptor into which the free end of the catheter projecting laterally from the needle is inserted, the end of the adaptor receiving the catheter defining an annular shoulder adapted to ride on the edges of the needle defining the slot.
9. A device as defined in claim 1, including an adaptor into which the free end of the catheter projecting laterally from the needle is in-

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serted, and an annular guard adapted at one end to seat on the end of the adaptor and tapered at the other end to provide an annular shoulder ring-
ing the catheter.

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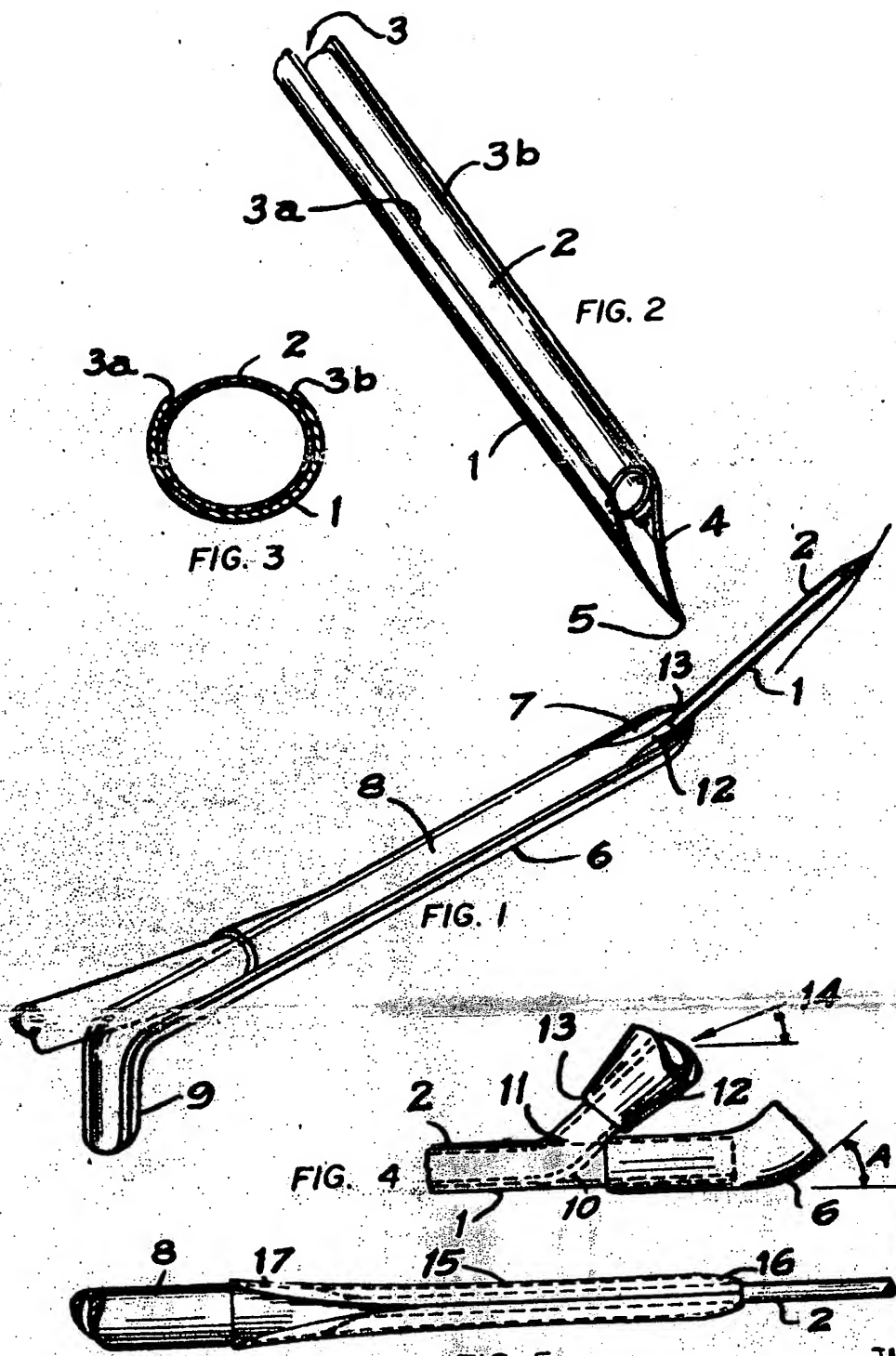


FIG. 5

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PATENT AGENTS

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